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The British Army's Counter-Battery Staff Office and Control of the Enemy in World War I*

Albert P. Palazzo

Introduction

THE literature of the Great War on the performance of the British Army has always contained a puzzling inconsistency. Vitriolic writings by veterans established the perception that mindless, muddle-headed generals dominated the army's command, which, through its stupidity, inability to change, and refusal to recognise the realities of modern fighting, doomed its men to slaughter in hopeless and costly attacks. Interwar memoirs by figures such as David Lloyd George and the works of B. H. Liddell Hart seemed to confirm the extent of British senior officer incompetence. Scholars such as Alan Clark, A. J. P. Taylor, Leon Wolff, Denis Winter, and Martin Samuels have perpetuated this interpretation through the persistent description of British Army inferiority relative to its opponents.[1] These discussions, however, consistently beg the question: if their leadership was so bad, how could the British have spearheaded the campaigns of autumn 1918 which led to the collapse of the Germans?

* The author wishes to acknowledge the Trustees of the Liddell Hart Centre for Military Archives, King's College, London, for permission to use materials from their collections.

1. Alan Clark, *The Donkeys* (London: Hutchinson, 1961); Leon Wolff, *In Flanders Field, The 1917 Campaign* (New York: Time Inc., 1958); A. J. P. Taylor, *The First World War: An Illustrated History* (London: Hamish Hamilton, 1963); Denis Winter, *Haig's Command: A Reassessment* (London: Viking, 1991); and Martin Samuels, *Doctrine and Dogma, German and British Infantry Tactics in the First World War* (Westport, Conn.: Greenwood Press, 1992).

This notion of idiocy and futility has resisted challenge. However, recently the historical community has started the serious business of trying to understand the methods the British employed in their struggle against the Germans. Building upon the ground-breaking work of John Terraine, scholars such as Tim Travers, Paddy Griffith, Bill Rawling, Robin Prior, and J. B. A. Bailey have begun to discredit the pervading indictment of wholesale military incompetence.[2] Instead, they have demonstrated that the British officer corps, far from being a stagnant, unthinking, unresponsive entity, was able to analyse the problems of the Western Front and implement the adaptations that would lay the foundations for victory.

This paper will attempt to make a modest contribution to this reassessment of the British Army and its leadership's ability and willingness to adapt. It will focus on one small but vital area, the British control of the battlefield through the suppression of the German guns. Artillery firepower is a particularly apt arena in which to conduct this reevaluation since gunnery, under the admittedly exceptional guidance of Colonel Georg Bruchmüller, is frequently acclaimed as one of the areas of German excellence and superiority. However, scholars such as David T. Zabecki and Bruce Gudmundsson have exaggerated the accomplishments of Bruchmüller, a proclivity resulting perhaps from the German's fecundity in publishing, in contrast to the silence of many excellent British artillerists. Zabecki goes so far as to praise him for forcing the German Army to adopt calibration and meteorological reports to improve gunnery accuracy, but fails to note that the British had incorporated these adaptations more than a year earlier.[3] While Bruchmüller's accomplishments were considerable, a fairer assessment would show that competition in the multi-faceted artillery adaptation contest was not so one-sided, and that by 1917, while the British were sometimes behind, they were on most occasions significantly ahead of their rivals.

In particular this paper will show that the critical turning point in the artillery war occurred during the winter of 1916–1917 when the British, drawing upon the lessons of the Battle of the Somme, created

2. Timothy Travers, *How the War Was Won: Command and Technology in the British Army on the Western Front, 1917–1918* (London: Routledge, 1992); Paddy Griffith, *Battle Tactics of the Western Front: The British Army's Art of Attack, 1916–18* (New Haven, Conn.: Yale University Press, 1994); Bill Rawling, *Surviving Trench Warfare: Technology and the Canadian Corps, 1914–1918* (Toronto: University of Toronto Press, 1992); J. B. A. Bailey, "British Artillery in the Great War," in Paddy Griffith, ed., *British Fighting Methods in The Great War* (London: Frank Cass, 1996); and Robin Prior and Trevor Wilson, *Passchendaele, The Untold Story* (New Haven, Conn.: Yale University Press, 1996).

3. David T. Zabecki, *Steel Wind: Colonel Georg Bruchmüller and the Birth of Modern Artillery* (Westport, Conn.: Praeger, 1994); and Bruce I. Gudmundsson, *On Artillery* (Westport, Conn.: Praeger, 1994).

a corps-level Counter-Battery Staff Office (CBSO). World War I was fundamentally a gunner's war, and of the artillery's various responsibilities, counter-battery became the most essential. The CBSO system gave the British a centralised staff of artillery personnel dedicated to the suppression of the enemy's batteries through the analysis and tactical application of intelligence. From the system's inception in January 1917, the British gradually gained the upper hand in the artillery war. By the war's conclusion, they were consistently able to destroy the enemy's equipment and personnel, reduce the morale and capabilities of hostile batteries, and at the moment of assault so thoroughly silence the German artillery that it would no longer be a factor in the battle. The German failure to emulate the CBSO system placed their artillery at a disadvantage, a liability from which they were unable to recover.

This paper also has a secondary objective. While it will discuss a large number of inventions which were essential to the British success, it hopes as well to stress that technology, though highly visible, is only one element of warfare. During the Persian Gulf War, the evening news's dramatic depiction of precision-guided munitions destroying Iraqi fortifications tended to focus attention upon the weapon, but, in fact, the more mundane intelligence and planning activities which lay behind the air strikes were of equal, if not, greater significance. The success of any weapon system is ultimately a function of the skill of its employment. The British recognition of the necessity for an artillery intelligence organisation enhanced their capabilities in target identification and selection, ordnance utilisation, and munition allocation. The overall product of these intellectual improvements was an enormous increase in effective firepower and a higher degree of success in counter-battery fire.

The Function of Artillery

Throughout the period of trench warfare, the objective of all the combatants on the Western Front was the restoration of mobility to battle. While a visualisation of the battlefield would suggest that its static nature was due to the rows of trenches and belts of barbed wire, it was, essentially, the superiority of defensive firepower over that of the offensive which led to both the struggle's indecisiveness and its appalling levels of bloodshed. The principal source of this prodigious firepower was the artillery; manoeuvre in the face of unsuppressed modern ordnance proved an extremely hazardous and costly operation. Therefore, the most significant problem facing the attacker was the need to overcome the defender's firepower so that assaulting troops could close with and break through an opponent's lines.

Martin Farndale, in his history of the Royal Artillery, noted that artillery does not win wars but enables wars to be won, and that in World

War I the infantry had no chance for success without the aid of the guns, while with them victory became possible.[4] During the war the primary function of British artillery was to establish the superiority of firepower that would allow the infantry to successfully attack. The artillery, despite being the principal killing agent, was essentially a supportive arm, whose sole function was to assist the infantry. The *Field Service Regulations* codified this relationship by concluding that the "infantry depends on artillery to enable it to obtain superiority of fire and to close with the enemy."[5] Reinforcing this theme, the regulations went on to conclude that "the principle of the employment of artillery in the battle is that the greater the difficulties of the infantry, the more fully should the firepower of the artillery be developed."[6] The requirements identified in *Artillery Notes*, the Army's foremost artillery publication series during the war, demonstrated that the British did not divert from this principle. The "*Notes*" declared that "effective artillery preparation is indispensable for success," and that "the artillery must aim at maintaining the closest touch with, and affording the greatest support to, the infantry."[7] *Artillery Notes* also declared that the task of the artillery was "to prepare the way for the infantry and to support and protect the infantry throughout its progress."[8]

Under the conditions of the Western Front the fulfillment of this obligation would require the British to develop their counter-battery capabilities to levels unimagined before the war. At the conflict's beginning, the field army had 500 artillery pieces, of which only twenty-four 60-pounders had the range and weight of shell to effectively suppress enemy batteries. By the war's end this force had expanded to over 6,500 weapons, including 2,000 medium and heavy howitzers whose primary function was counter-battery fire. Doctrinally, the prewar army had not foreseen the importance of counter-battery fire and instead had focused upon the support of the infantry during the final stages of the assault. The prewar artillery also neither possessed the equipment to locate hidden targets, nor trained in the techniques required to fire without direct observation.[9]

While the concentration of fire on hostile batteries might appear to be outside the artillery mandate of infantry support it does, in practice,

4. Martin Farndale, *History of the Royal Regiment of Artillery* (Woolwich: Royal Artillery Institution, 1986), 332, 336.

5. General Staff, War Office, *Field Service Regulations*, Part 1 *Operations (1909)* (London: HMSO, 1914), 14.

6. Ibid., 143.

7. General Staff, *Artillery Notes: No. 4, Artillery in Offensive Operations* (February 1917), 5.

8. Ibid., 15.

9. Farndale, *History of the Royal Regiment of Artillery*, 3–4; and J. B. A. Bailey, *Field Artillery and Firepower* (Oxford: The Military Press, 1989), 51, 120–21.

conform precisely to British principles. Inflicting casualties on enemy gunners, breaking their morale, or destroying their equipment was only a means to an end. Successful counter-battery fire would prevent the enemy's guns from undertaking defensive barrages, thereby greatly increasing the chances of the survival of the infantry as they crossed No-Man's Land. Furthermore, the continued neutralisation of hostile batteries would enable the infantry to consolidate their gains more quickly and safely and also prevent the German guns from assisting their own infantry in counter-attacks to regain the lost positions.[10]

The British regarded counter-battery fire as a constant, on-going struggle, and they strove to obtain superiority over the enemy's guns. *Artillery Notes* mandated that: "Counter-battery work is not a matter of spasmodic effort, but is a continuous operation depending for success on accuracy of fire, continuity of plan, unremitting study and firm control."[11] Even during periods of relative calm between battles, the gunners were to maintain their efforts to suppress hostile batteries.

The British counter-battery methodology contained four elements, namely:

1) Destruction of the enemy's batteries.
2) Destruction of artillery personnel.
3) Fire to obstruct ammunition supply.
4) Neutralization.[12]

The reader might benefit from a brief description of these terms. The British targeted either the enemy's equipment (guns, ammunition dumps, carriages, emplacements, etc.) or their personnel. To destroy an enemy battery usually required a slow methodical fire with the assistance of either ground or aerial observation which could correct the fall of the shells. The ammunition employed was exclusively high explosive. To destroy personnel required a sudden, concentrated burst of either high explosives, shrapnel, or lethal gas that would have the desired effect before the enemy soldiers obtained the shelter of their dug-outs or gas masks. As a variant, the British also had considerable success against personnel by subjecting the target to a prolonged chemical bombardment. This tactic aimed at causing casualties through the exhaustion of the enemy's respirators, which had a life expectancy of only a few hours.[13] The British objective in shelling to obstruct ammunition supply, and other forms of harassment fire, was to lessen the operational capabilities of a

10. A. G. L. McNaughton, "Counter Battery Work," *Canadian Defence Quarterly* 3 (July 1926): 380.

11. General Staff, *Artillery Notes: No. 3, Counter-Battery Work* (February 1918), 5.

12. Ibid., 14.

13. For the tactics of the use of gas shells, see General Staff, *Instructions on the Use of Lethal and Lachrymatory Shell* (March 1918).

hostile battery. By isolating the target from rearward communications and supply sources, the British hoped to lower the enemy's morale. They usually carried out such a mission at night and frequently engaged in lengthy bombardments with chemical munitions. The artillery employed neutralisation fire when it was necessary to silence hostile batteries for a specific period of time, such as for the duration of a raid or during an assault. It had certain advantages over destructive missions in that it had a wider tolerance for accuracy and did not require observation. The British employed a mix of munitions for this mission. Initially they favoured high explosives but once chemical shells became more available in 1917 gas became the preferred munition.

The Emergence of the CBSO

Although the Somme was a terrible ordeal for the front-line soldier, it proved a vital learning experience for the army. The course of the battle made it clear that if the British were ever to achieve victory, they would have to modify their tactics so that their offensive firepower would be able to suppress the defender's defensive fire. Part of the blame for the loss of 60,000 men on the Somme's first day was rightly placed upon the gunners and their failure to destroy or suppress the enemy's batteries, despite a massive preliminary bombardment. When the infantry attacked, they advanced into a storm of fire not only from the defender's rifles and machine guns but also from German guns which executed their preplanned defensive barrages.

After the battle the British prepared a report on the offensive's lessons, which emphasised the future direction of their artillery. Among many observations, the report stressed a need for the coordination of artillery operations at the corps level and the necessity for improved cooperation between gunners and intelligence gathering units. The report also contained a section dedicated to counter-battery fire which validated the increased importance of this mission. During the preparation for the Somme, one corps listed counter-battery fire as seventh of ten missions for the heavy and siege artillery.[14] The new policy established after the Somme, however, required the artillery to make use of every available opportunity to destroy the enemy's guns and instructed that, "if a battery can be located, destroy it; the chance may never recur."[15] The report concluded:

14. See "XV Corps Instructions for a Preliminary Bombardment," 12 June 1916, in *Military Operations, France and Belgium, 1916*, Appendix, *Sir Douglas Haig's Command to the 1st July Battle of the Somme* (London: Macmillan and Co., Limited, 1932), 184.

15. "Artillery Lessons Drawn From the Battle of the Somme," n.d., Montgomery-Massingberd Collection, 48, Liddell Hart Centre for Military Archives.

> Nothing must permit us to be deflected from the pursuit of our object. This is easy to say, but there are two tempters ever on the prowl to lead us away from our quarry. The first is the employment of the Counter-battery Heavy Howitzers for other tasks, and the second is the employment of the Counter-battery aeroplanes for bombing enterprises and Trench shoots.[16]

Finally, the report stressed the need for detailed planning based upon constant observation of the enemy, and recognised that operations must be subject to revision up to the moment of attack.[17]

The lessons the British identified would lead to a fundamental change in their approach to counter-battery fire. The report raised the status of this mission to paramount importance, recognised the urgency for weapons dedicated to its pursuit, and suggested the need for an agency to coordinate intelligence and plan missions. Even before the Somme came to an end, the British had begun the process of adaptation. The 15 September 1916 attack was the first to employ organised counter-battery work. In November, III Corps created the first CBSO.[18] By the New Year, GHQ required all corps headquarters to establish a CBSO.[19]

The Somme lessons also revealed the beginning of a shift in methodological preference among the four elements of counter-battery techniques. While a report prepared by Fourth Army continued to highlight destructive fire in conjunction with aerial observation, it also elevated the importance of neutralisation, especially during poor flying conditions and on the day of battle. It set the artillery's objective for the assault as the neutralisation of "all hostile batteries known to be or likely to be active."[20] This objective would become the goal of the gunners for the remainder of the war, and was a task at which they would succeed brilliantly in the conflict's closing months.

16. Ibid.

17. Ibid. Farndale includes among his lessons of 1916 the need for an exclusive artillery intelligence system and for the British to make the maximum effort towards counter-battery fire. See Farndale, *History of the Royal Regiment of Artillery*, 334.

18. "III Corps Counter-Battery Report," WO95/692, Public Record Office (hereafter cited as PRO); "Senior Division: Lecture Artillery No. 4, Evolution of Artillery Organization and Command," 1924, 4/7/8, Viscount Alanbrooke Collection, Liddell Hart Centre for Military Archives; and "Notes on Counter-Battery Lecture by Lieut.-Col. Moberley," n.d., 4/7/5, Viscount Alanbrooke Collection, Liddell Hart Centre for Military Archives.

19. The exact date when a corps set up its CBSO varied, but a review of a number of corps War Diaries showed that this office became operational during the winter of 1916–17. For example, the Canadian Corps established a CBSO on 10 February 1917 and XVIII Corps had one in early January 1917. See "War Diary XVIII Corps," WO95/955, PRO; and "Notes on Counter Battery Work in Connection With the Capture of the Vimy Ridge by the Canadian Corps on April 9th 1917," WO95/1059, PRO.

20. Ibid.; and "The Artillery of the Fourth Army," n.d., Montgomery-Massingberd Collection, 48.

The emergence of the CBSO during the winter of 1916–17, and the eventual success of the British in reaching their counter-battery goals, were greatly assisted by the maturing of a number of intelligence gathering technologies along with improvements in gunnery accuracy. With the onset of trench warfare, the opponent's guns, by occupying reverse slopes, hiding in villages or woods, or using camouflage, had become largely invisible. Under these conditions, artillerymen had to learn not only the art of indirect fire but also to locate the enemy in the first place. The former was actually the less significant of the problems, as the Royal Artillery did contain branches that understood the principles of indirect fire, the Siege and Garrison Artillery; these specialists could instruct the rest of the gunners. The latter issue, however, was equally critical because imprecise knowledge of the enemy's dispositions would not only result in poor counter-battery fire but would also lead to the wastage of scarce munitions as shells fell on an empty landscape. It was therefore essential to locate the enemy accurately if counter-battery fire were to play its designated role.

Before moving on to a discussion of the organisation of the CBSO, it is necessary to identify briefly other advancements that played a role in the ability of this agency to operate. The adaptations fell under two broad categories, those that improved the accuracy of the guns and those that enhanced the means to plot the enemy's location. No single improvement was decisive, but in combination they would create a revolution in the application of fire power.

A number of branches contributed to improvement in the accuracy of the guns. The Royal Engineers were responsible for survey work which resulted in the creation of detailed maps of the British and German lines. A good map is a prerequisite for gunnery accuracy, as it is necessary to know the precise position of not only the enemy's weapons but also one's own.[21] The Royal Flying Corps assisted by detailing squadrons to artillery observation missions. The plane's pilot, or in a two-seater the observer, noted the fall of shells and alerted the gunners to the appropriate adjustment. The development of a meteorological reporting network provided the gunners with information on wind direction and velocity, barometric pressure, and temperature, all of which affect the flight of a shell.[22] Individual gun calibration, employing machinery perfected by the engineers,

21. For a summary of the Royal Engineers survey work during the war, see H. St. J. L. Winterbotham, "Geographical and Survey Work in France, Especially in Connection With Artillery," *Journal of the Royal Artillery* 46, no. 4 (1919): 154–72; and Lawrence Bragg, A. H. Dowson, and H. H. Hemming, *Artillery Survey in the First World War* (London: Field Survey Association, 1971).

22. For a summary of meteorological reporting, see Appendix K in Farndale, *History of the Royal Artillery Regiment*, 372–73.

allowed the gunners to measure the muzzle velocity of their weapons and thereby assign a corrective range modifier to each piece. The result of these adaptations would be the mastery of predicted fire—the ability to deliver a coordinated bombardment upon specified map coordinates without prior registration.

Of equal importance was the development of techniques to locate the enemy's batteries. In 1915 the Royal Engineers organised units which specialised in sound ranging and flash spotting. These relied upon the recording of a sound wave or the observation of a flash of light. Sound ranging employed a series of microphones connected to a central recording machine which registered the movement of both the sound wave generated by the gun's blast and also of the subsequent explosion of the shell. By measuring the difference in the time it took the sound wave to reach each microphone, the engineers could calculate the location of the source. As different ordnance types have specific sound wave characteristics, the British could also determine the hostile gun's calibre. The sensitivity of sound ranging equipment was such that the firing of a single round was sufficient to give away a gun's location. Flash spotting required an observer to fix a theodolite, a surveying instrument for the measurement of angles, upon the discharge flash of an active weapon. Once three or more spotters had aligned their instruments upon the same flash it was relatively easy to determine the battery's position through triangulation. Under good conditions both of these techniques could place a hostile unit to within twenty-five to fifty yards.[23] The Royal Flying Corps and the balloon service also provided critical information on the location of hostile weapons. Through visual observation, or, more reliably, the study of aerial photographs, the British could confirm the location of an enemy battery whose presence had been suggested by other methods.[24] Although each of these techniques had limitations, when combined with the assistance of forward observers, the interrogation of prisoners, the interception of

23. Neither of these techniques was perfect and could be rendered useless by the weather or the terrain. If the wind was blowing directly at an active battery, it lifted the sound wave upwards above the recording instrument. While highly effective at night, flash spotting was difficult during daylight as accurate observation was virtually impossible without a direct line of sight. For a summary of sound ranging, see Appendix L in Farndale, *History of the Royal Regiment of Artillery*, 374–79; and Winterbotham, "Geographical and Survey Work in France," 160–64. Also see, General Staff, *Sound Ranging* (March, 1917); and for a technical description, see *Manual of Sound Ranging* (London: HMSO, 1922).

24. Due to the use of camouflage, poor weather, and interference from hostile interceptors, observer aircraft generally had difficulty locating an enemy battery unless it was actually in action or its general location had already been suggested by the flash spotters or sound rangers. See Winterbotham, "Geographical and Survey Work in France," 165; and McNaughton, "Counter Battery Work," 382.

enemy wireless traffic, and the study of captured documents, they allowed the British to build up a highly accurate map of the enemy's dispositions.[25]

The CBSO was never a large entity. Generally commanded by a lieutenant colonel, it also contained several artillery officers with experience in the preparation of bombardment fire plans or in the management of intelligence, as well as a number of enlisted men for typing, map-making, and administrative duties. The total number of personnel was probably only about a dozen, despite the need to man the office round-the-clock so as to deal with any activity by the enemy. The Canadian Corps roster provides an example of the organisation. At its founding in February 1917, the establishment contained, in addition to the commander, only a staff captain, an orderly officer, and two clerks, one of whom was on loan. The Canadians quickly realised that this was inadequate, and by Vimy they had added three officers and five clerks, bringing the total to thirteen. This was the minimum staff with which the Canadians were able to carry out the office's responsibility.[26]

The duties of the CBSO can be summarised as:

a. Collecting and compiling counter-battery intelligence.
b. Disseminating counter-battery intelligence to all concerned.
c. Liaising with flank counter-battery organizations.
d. Advising the General Officer Commanding Royal Artillery as to the quantity and disposition of artillery required for counter-battery work.
e. Issuing orders for survey units and cooperation of corps squadron RAF.
f. Providing detailed arrangements and issuing orders for counter-battery work.[27]

The CBSO thus wore multiple hats. While technically a staff office, it was, for all practical purposes, a tactical headquarters charged with an objective that was central to any offensive operation. Furthermore, while its skills would be required most intensively at the commencement of a battle to assure the suppression of the enemy's guns, artillery supremacy was an on-going goal which the gunners pursued constantly, even during quiet periods.[28]

25. For an assessment of these other forms of intelligence collection, see McNaughton, "Counter Battery Work," 383–84.

26. "Notes on Counter Battery Work in Connection With the Capture of the Vimy Ridge by the Canadian Corps on April 9th 1917," WO95/1059, PRO; and C. N. F. Broad, "Artillery Intelligence and Counter Battery Work," *Journal of the Royal Artillery* 49, 5 (1922–23): 221–22.

27. "Senior Division: Lecture Artillery No. 2, Counter-Battery Work and Artillery Intelligence," 1923, 4/7/5, Alanbrooke Collection, Liddell Hart Centre for Military Archives.

28. Ibid.

Administratively, the army attached the CBSO to the staff of the General Officer Commander Royal Artillery—Corps (GOCRA), the headquarters for corps artillery; however, its physical location was usually in close proximity to the headquarters of the Commander Corps Heavy Artillery. The corps was chosen as the level to coordinate counter-battery actions because the types of ordnance most frequently used for this mission were normally under corps control. Additionally, the intelligence collection units—the observation squadrons and the flash spotters and sound rangers—were all corps-level assets. Finally, it was the corps, rather than the division, whose zone had a length of front most suited for controlling counter-battery fire. A divisional front was simply too narrow because the range of the weapons employed exceeded the area under the observation of units smaller than the corps.[29]

The chain of command of the CBSO did have the potential to cause friction between the various command, combat, and intelligence elements. The difficulties of the relationships were:

a. The CBSO was a staff officer of the GOCRA of the corps, but owing to the nature of the work required of him, it was necessary to establish his office at the H.Qrs [headquarters] of the heavy artillery of the corps.
b. It was his duty to advise the GOCRA of the corps as to the guns required for CB [counter-battery] purposes, but these guns had to be found by the corps heavy artillery commander.
c. He was nominally a staff officer, but for practical purposes had to assume executive command of guns detailed for CB work.
d. Whilst responsible for the tactical handling of guns detailed for CB work, the heavy artillery commander remained responsible for their technical efficiency.[30]

Thus the CBSO had to combine the role of a staff officer with that of a combat headquarters, while not having any direct control over any of the elements required to fulfill its mission. The sources do not explain what steps the British took to minimize these potential points of tension. However, it is clear that the CBSO had support at the highest levels, and its attachment directly to the staff of the GOCRA assured compliance with its orders throughout the corps. Furthermore, the British did not modify the position of the CBSO or its relationship with the various corps assets

29. A. F. Brooke, "The Evolution of Artillery in the Great War, Part IV: The Evolution of Artillery Organisation and Command," *Journal of the Royal Artillery* 52, 3 (1925–26): 380.

30. Ibid., 381.

upon whom it depended. This suggests that any conflicts were minor and that, in general, the system operated efficiently.[31]

The CBSO managed its responsibilities, and communicated with its artillery and intelligence partners, through a series of reports. The most important included:

a. Daily Artillery Intelligence Report: The CBSO issued this daily, covering the period of 6 PM to 6 PM. It contained information, including the location, on all confirmed and suspected hostile battery emplacements on the corps and adjoining corps's fronts.
b. Programs of Pre-arranged Shoots and Reports: The CBSO issued this each evening as an analysis of the success of the day's program of planned bombardments that the artillery had undertaken with the assistance of aerial observation.
c. Weekly Report on Hostile Battery Activity: Issued by the CBSO each Thursday, this report provided information on the attitude of the enemy's artillery opposite the corps front, the number and calibre of active hostile batteries, and any deductions based upon the week's work.
d. List of Hostile Batteries: The CBSO issued this on a frequent basis and provided the numbers and coordinates for every confirmed hostile battery in the corps counter-battery area as well as that of the adjacent corps.[32]

The CBSO also maintained a Record Sheet on every enemy battery, a Fighting Map and a Suspect Map. The staff used the Record Sheet to note the activity of hostile units and the results of British counter-battery attacks. They kept this not only to track a battery's status but also to figure out its arc of fire from its pattern of operations. Using this information, the CBSO could plan an operation to ignore German batteries that were inactive, or which could not bring fire to bear upon the anticipated combat zone, thereby maximising British strength against those hostile units which could interfere with an attack. Lastly, the Fighting Map recorded every friendly and confirmed German gun location while the Suspect Map noted the possible location of an enemy battery.[33]

While its staff was small, the CBSO did have access to considerable assets. To facilitate the collection of intelligence, each CBSO had at its direction an Army Field Survey Company of engineers for sound ranging and flash spotting, a squadron of reconnaissance planes, and a section

31. General Staff, *Artillery Notes, Counter-Battery Work*, 6–7.

32. "Notes on Counter Battery Work in Connection With the Capture of the Vimy Ridge by the Canadian Corps on April 9th 1917," WO95/1059, PRO.

33. Ibid. Also see Broad, "Artillery Intelligence and Counter Battery Work," 223; and McNaughton, "Counter Battery Work," 386.

of kite balloons. Additionally, corps policy required forward observers and front-line infantry officers to submit to the CBSO all instances of enemy artillery action, including the calibre and location of the hostile battery. Lastly, the CBSO received reports from prisoner interrogations and transcripts of enemy radio transmissions.[34] These units served as the eyes and ears for the CBSO, and the information they provided was the basis of counter-battery operations.

Although the CBSO did not directly command any guns, the office did have guaranteed access to the corps's heavy artillery batteries, and it prepared the orders for the guns engaged in counter-battery work. It was routine policy for the GOCRA to reserve the corps's 6-inch howitzers and 60-pounder guns for the use of the CBSO. However, the CBSO could draw upon virtually any calibre of weapon within the corps's establishment. Counter-battery shoots which included the divisional 4.5-inch howitzers and 18-pounder guns were extremely common, and the CBSO frequently drew up programs which included the corps's 8-inch and 9.2-inch howitzers or even the super-heavy 12-inch howitzers or guns. The determining factor in the allocation of resources was what weapons best met the need of effective counter-battery fire.[35]

By concentrating both command and staff functions in the CBSO, the British succeeded in creating a centralised organisation for the management of counter-battery operations. The CBSO was at the centre of an intelligence collection network which provided the means to find the location of the enemy's batteries. It was the responsibility of the CBSO to sift through the myriad bits of intelligence and painstakingly create a map of the enemy's position, the calibre and status of their guns, and the pattern of their fire. Having achieved this, the CBSO then drew up orders daily for the British artillery to destroy or neutralise their opponent. The result was a CBSO which served as a nerve centre coordinating the work of the intelligence gathering units with the offensive resources of the artillery. This system improved the army's effective use of its firepower and gave the artillery the means to fulfill its primary mission of supporting the infantry.

The CBSO and Battle

Nineteen seventeen was a period of learning and refinement as CBSO personnel became increasingly proficient at their task. The first test occurred at the Battles of Arras and Vimy on 9 April. Both attacks featured

34. "Senior Division: Lecture Artillery No. 2, Counter-Battery Work and Artillery Intelligence," 1923, 4/7/5, Viscount Alanbrooke Collection, Liddell Hart Centre for Military Archives.

35. "Counter-Battery Office—Canadian Corps," 12 October 1918, WO95/1060, PRO.

an unprecedented awareness of the importance of counter-battery fire, exemplified most significantly by the allocation of specific resources to the mission. For Arras, Third Army orders identified the 6-inch, 8-inch, 9.2-inch, and 12-inch howitzers principally as counter-battery weapons, and at Vimy the First Army made a determined effort to incorporate the results of intelligence activities with operations.[36] These battles also demonstrated the increasing employment of gas for neutralisation. At Vimy the Canadian Corps reserved chemical munitions almost exclusively for counter-battery work. The decision to use gas increased the role of the CBSO because it made available additional assets for counter-battery, as this ammunition was at first available only for the 4.5-inch howitzer and the 60-pounder gun.[37] Postbattle assessments showed that intelligence had correctly located 86 percent of the 212 German batteries on the Vimy front and that this had allowed for a high degree of accuracy in the fire plan.[38] Interviews with 40 captured gunners from 21 batteries after Arras revealed that the British had correctly identified and engaged 20 of their positions, even though some had only moved into their emplacements a few days before the battle. The report continued that, "in some batteries all the guns had been knocked out by direct hits, and almost all batteries had one or two guns out of action."[39] Furthermore, the counter-battery harassment program had also been effective, as some German positions had few shells or were missing propellant charges. The report also concluded that the chemical counter-battery missions had little effect, partially due to wind conditions but also because the German gunners had already been so severely affected by destructive bombardments that the gas was not really needed.[40] A final British observation was that they had certainly punished the enemy's artillery in these battles.[41]

At Messines in June the CBSO system received another test, and once again the British achieved a high degree of superiority over their opponent.[42] However, Passchendaele, commencing on 31 July, would prove

36. Cyril Falls, *Military Operations, France and Belgium, 1917*, vol. 1, *The German Retreat to the Hindenburg Line and the Battles of Arras* (London: Macmillan, 1940), 183, 312.

37. "Report on Preparation of Gas Shell Bombardments, Canadian Corps—Attack on Vimy Ridge," 9 April 1917, RG9IIIC1, vol. 3922, National Archives of Canada; and "Notes by Captain H. Hartley on the Use of Chemical Shell at Arras," 13 April 1917, Hartley Collection, 42, Cambridge Archives Centre.

38. Falls, *Military Operations, France and Belgium, 1917*, 1:314.

39. "Notes by Captain H. Hartley on the Use of Chemical Shell at Arras," 13 April 1917, Hartley Collection, 42.

40. Ibid.

41. "Counter Battery Work, 1914–1918," n.d., Haig Collection, 3155/214G, National Library of Scotland.

42. Ibid.

another matter. The British attack out of the Ypres Salient had a significant geographical disadvantage. The German artillery surrounded the British position on three sides and also occupied higher ground. With the start of the battle it began to rain, and the ensuing quagmire of mud made the repositioning of guns and the movement of supplies an extremely slow and arduous task. A study produced after the campaign noted the desperate nature of the situation, made all the harder by the enemy's introduction of mustard gas and the near collapse of the CBSO system.[43] When they entered the line in October, the Canadian Corps found counter-battery arrangements in considerable disarray. The dense concentration of British guns within the salient made them easy targets for the Germans who were more evenly distributed around the perimeter. Furthermore, the heavy artillery, as well as the sound ranging and flash spotting sections, had failed to keep up with the advance and were too far back to play a useful role. The Royal Flying Corps, hampered by poor weather, also had difficulty in providing intelligence from observation or aerial photography. The lack of sound intelligence, coupled with the difficulty of moving the guns forward through the mud and the limited routes over which to maintain artillery supply, resulted in an extremely dire counter-battery situation. Before attacking, the Canadians undertook an extensive redeployment of the artillery and reorganised the intelligence gathering network. This resulted in some improvements, but the problems of getting the guns and survey sections forward through the mud and providing a steady rate of supply were immense. As a consequence, the counter-battery system never operated at the levels of efficiency it had achieved at Arras and Messines or which it would reach in 1918.[44]

While Passchendaele was a failure, the last battle of 1917 would restore momentum to counter-battery operations. Third Army's attack at Cambrai on 20 November is best known as the occasion of the first employment of massed tanks, but, in reality, it was the artillery that introduced the more significant innovation. The tank was a weapon of the future and would remain an unwieldy, fragile and vulnerable behemoth for the rest of the Great War. However, for the gunners, Cambrai represented the first time that they organised their operations around the principles of precision fire. Additionally, Third Army recognised the critical importance of counter-battery fire and dedicated 75 percent of its heavy guns to the mission. Working from information gathered by the observation groups, the Royal Flying Corps, and other intelligence sources, the CBSO had plotted the location of most of the enemy's batteries. The CBSO

43. "Canadian Corps Artillery Report on Passchendaele Operations," WO95/1059, PRO.

44. "Canadian Corps Artillery Report on Passchendaele Operations, 17 October to 18 November 1917," WO95/1059, PRO.

then issued fire plans that called for the neutralisation of the enemy's artillery at zero hour. The improvement in gunnery accuracy combined with precise targeting permitted the British to forsake a lengthy preparatory bombardment and to obtain surprise. Predicted fire was a revolution in artillery tactics, but what made it so effective was the CBSO's success in locating targets and developing suppression plans. Cambrai also represented a dramatic change in the emphasis of counter-battery techniques. While the British had until this point preceded their battles with extensive preparatory bombardments, after Cambrai they focused on the far easier-to-obtain technique of neutralisation.[45]

The battles of 1917 confirmed that the British had been correct in their appreciation of the need to centralise counter-battery operations, and in the second half of the following year the CBSO would achieve its goal—the total domination of the enemy's guns. First, however, the allies would have to withstand the anticipated German attacks in spring 1918. The Ludendorff Offensives revealed the limitations and ineffectiveness of the CBSO system in the defense. Observation technologies in World War I, as today, did not have the ability to locate batteries as long as they remained silent. A temporarily resurgent German air force also prevented detailed reconnaissance by British planes. Furthermore, since the initiative lay with the enemy, the British intelligence gathering units did not know upon which sectors to focus their investigations. The result was that the Germans succeeded in concentrating on the attack front over 6,400 guns, which revealed their presence only with the commencement of the battle on 21 March. Although the blow shattered the British Fifth Army, the Allies did not collapse, nor did further enemy attacks in April through June lead to a German success.[46]

Once the Ludendorff offensives had run their course, the British were ready to return to the offensive. Their first affair was the modest yet significant Australian Corps attack at Hamel on 4 July. Hamel built upon Cambrai and represented the successful convergence of a number of technological and tactical innovations that the British had pursued since 1916. The integration of tanks into the assault, the mastery of precision indirect fire, and the incorporation of gas into all aspects of the attack, along with the adoption of fire and movement tactics by the infantry, led to an offensive system which enabled the British to overcome the defenders' firepower and restored a degree of mobility to the battlefield.

Hamel succeeded brilliantly, and the Australians rapidly advanced to their final objectives. While the battle is a sterling example of a properly integrated combined arms and multi-technology operation, it was the work

45. Wilfrid Miles, *Military Operations, France and Belgium, 1917: The Battle of Cambrai* (London: HMSO, 1948), 10–13.

46. Bailey, *Field Artillery and Firepower*, 339.

of the CBSO which was most central to the British operational scheme and to the attack's success. Artillery intelligence had accurately noted the location of enemy battery positions, principally in the Lamotte-Cérisy Valley two miles to the east of Hamel. The silencing of these weapons was essential to ensure the survival of the exposed infantry as they crossed No-Man's Land. Furthermore, successfully dealing with the hostile batteries took on an even greater degree of urgency than usual because, for the sake of obtaining surprise, there had been no preliminary bombardment by which to destroy physically the German guns and battery positions and to exhaust their personnel. The Australians' commander, Lieutenant General John Monash, had even gone so far as forbidding registration rounds to preserve secrecy. Accuracy in locating the enemy's pieces and precision in firing, as well as a fire program which could instantly neutralise the German guns at zero hour, were therefore crucial to the attack's outcome.[47]

The counter-battery program proved a nearly complete success; stunned by a hail of chemical, high-explosive, and shrapnel shells, few enemy gunners were able to man their weapons and fire their defensive barrages. The diligence of the British gunners, working from programs developed by the CBSO, had removed the German guns from the battle, and at zero hour the enemy's artillery remained virtually silent. The British program was so thorough that the infantry had one of the easiest advances they had experienced during the war. They went over the top at 3:10 AM, and less than two hours later the Australians had begun to dig in at their final objectives. With the conclusion of the advance the CBSO program entered its post-assault phase. The artillery staff had drawn up a plan to immediately neutralise any German battery that fired over the next several days as the Australians consolidated their gains. The rationale of this plan, Counter-Preparation Phase 1A, was the continued suppression of the enemy's guns to prevent a German counter-attack. Once again the plan was a complete success, and the Germans did not seriously try to regain the lost positions.[48]

Hamel was significant for more than just its easy obtainment of tactical objectives, however. The ability of the Australians to leave the protection of the trenches, survive the passage of No Man's Land, and speedily penetrate to their final objectives, at minimal cost, indicated that the British had succeeded in restoring mobility to battle. At the Somme, the gunners had attempted to obliterate the enemy through a prolonged bombardment. At Hamel, the artillery had the far simpler task of neutralising

47. "A History of the Development of the British Artillery in France," 204, Rawlins Collection, Royal Artillery Institute.

48. "Australian Corps Heavy Artillery Defence Scheme," July 1918, AWM26/364/12, Australian War Memorial.

the hostile batteries during that brief, critical period when the infantry assaulted. The British accomplished this task because they had developed the means to locate, identify and target German guns through the coordinating agency of the CBSO.

Neither was Hamel a mere aberration. The crucial test of the CBSO was the Battle of Amiens on 8 August. While Hamel had been a limited corps-level action, Amiens would involve all the resources of the Fourth Army. Despite the increase in scale, the British plan was very similar. The attackers, again hoping to preserve surprise, would forego a preliminary bombardment and rely upon effective counter-battery fire to neutralise the enemy's guns at zero hour. Therefore, once again, the success of the battle and the survival of the infantry relied upon the skill of the CBSO in correctly discovering the enemy's artillery dispositions and designing a fire program that would instantly neutralise the hostile guns.

At 4:20 AM on 8 August, Fourth Army's artillery suddenly unleashed a furious bombardment of gas and explosives on the enemy's battery positions. Simultaneously, British tanks, followed by infantry, began their assault across No Man's Land. Although exposed and vulnerable, the infantry safely made the passage and stormed into the enemy's positions, rounded up prisoners, and pressed on to their objectives. The British counter-battery program had silenced its targets, and the force of the bombardment was so powerful that only a few German batteries would escape. The British would capture over four hundred guns. Intelligence proved critical in this operation as the British had again successfully located most of the enemy's artillery.[49]

Hamel and Amiens established the pattern of counter-battery activities for the rest of the war. Perfected, and fully operational, the CBSO system would continue to dominate the enemy's artillery until the Armistice. The war's final battles would provide further tests, but the CBSO had firmly established itself as a key feature in the planning and execution of offensive operations. Even the strong fortifications of the Hindenburg Line would not stem the advance of the British Army. When the Fourth Army attacked its defenses on 26 September, the British once again removed the enemy's artillery from the contest. Deprived of this crucial support, the German defenders were unable to prevent the British infantry from breaching the Hindenburg Line and thereby forcing them into another retreat.

49. "Lecture, Artillery in Offensive Operations," 1918, Uniacke Collection, XI, Royal Artillery Institute; and James E. Edmonds, *Military Operations France and Belgium, 1918*, vol. 4, *8th August–26th September The Franco-British Offensive* (London: HMSO, 1947), 154–55.

Conclusion

Despite limitations, the CBSO proved to be one of the most significant adaptations of the war. Through the efforts of its staff, the British gained an ascendancy over the enemy's artillery, an advantage they never relinquished. By the end of 1917 the Germans had also realised the importance of a centralised planning agency for counter-battery operations, but were unable to implement a similar system by the war's end. Their failure to emulate the British was the result of administrative and tactical shortcomings in the organization of their artillery, not due to any shortage of fire-power. German gunners were slow to recognise the value of predicted fire and Bruchmüller had to overcome extreme reluctance in order to impose his ideas. More importantly, in contrast to the centralised nature of the CBSO, the Germans emphasised the decentralised control of artillery assets up to the war's end. In 1917, Bruchmüller did create a mechanism for the management of artillery at the army level; however, this was a temporary, ad hoc organization and not a permanent specialist position. The Germans limited its function to the preparation for an attack, and the control of the artillery reverted to local commanders with the battle's commencement. The planning for another operation required the reestablishment of another temporary office. The German Army also did not allocate artillery to the corps level until May 1918, and then only in limited quantities. The vast majority of their guns remained either within the establishment of the front-line units or in the general artillery reserve. Without a permanent office with a dedicated staff and resources, the Germans lacked the organizational hierarchy essential for the effective pursuit of counter-battery operations, and their gunners were unable to match their rivals in the struggle for artillery supremacy.[50]

The CBSO system was not a perfect solution to the problems of effective counter-battery fire, but it was the best mechanism to emerge during the war. Problems did occur, generally as a result of the odd position of the CBSO in the administrative hierarchy. As a staff office it had the unusual responsibility of issuing orders to artillery units not under its command. Additionally, the CBSO had to establish a close liaison with the survey units of the Royal Engineers and the observation squadron of the Royal Flying Corps.[51] The CBSO also had difficulty operating in the defense or under conditions of mobile warfare. Once the Germans began their retreat in 1918, the need to update constantly the location of every enemy

50. Brooke, "The Evolution of Artillery in the Great War," 384–86; and Zabecki, *Steel Wind*, 56, 64–65.

51. For an example of a CBSO commander who refused to understand the benefits of the information gathered by the survey sections and who continued to dispatch shells onto empty terrain, see H. H. Hemming, "Counter Battery," in Bragg, *Artillery Survey in the First World War*, 19.

battery overwhelmed the intelligence units and the CBSO. Additionally, the engineers had problems getting forward and maintaining contact with the enemy. To set up their equipment took the sound rangers forty-eight hours, and the flash spotters at least half a day. However, whenever the Germans stopped to make a stand, the intelligence gathering units would go into operation and the CBSO would renew its struggle against the enemy's guns.

The CBSO, however, was more than just a tactical adaptation. It was a reflection of the vibrancy of British experimentation and their determination to find solutions to the stalemate on the Western Front. It was merely one component in a broad-based effort to adapt operations to the conditions of combat in France. The invention of the CBSO is evidence that the dullard reputation of British leadership is a false one. Comments such as those by Samuels, which describe the British method of waging war as one based upon rigid unthinking obedience, obsessive parade drill, and the limited capabilities and training of the troops, are far too simplistic and unfair. The problems of the Great War were extremely complex, and while it was a long and horrific affair, the British did seek out new ideas, inculcate novel techniques, and modify their operations to bring the struggle to a victorious end.[52]

52. Martin Samuels, *Command and Control? Command, Training and Tactics in the British and German Armies, 1888–1918* (London: Frank Cass, 1995), 284–85.